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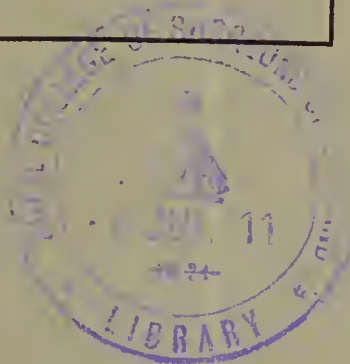
ARTERIAL LIGATION FOR IRRE-
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By

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ARTERIAL LIGATION FOR IRREMOVABLE CANCER OF PELVIC ORGANS—TECH- NIC ADAPTED, AND AMPLIFIED.*

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Careful students of the cancer problem have doubtless observed the desultory manner in which many methods of treatment for this disease have been employed, and the tendency to periodic revival of interest in measures thus used. It has perhaps been noted, too, that while non-surgical methods of treatment are the more apt to be employed in the manner described, surgical procedures, in a few instances, have received the same desultory attention, and have undergone the same periodic revival, each renewal of interest being marked by modifications of technic and amplification of usefulness.

Arterial ligation, particularly as applied to the treatment of cancer, presents a conspicuous illustration of this swinging of the pendulum of interest, as a brief review of the history of the subject will suffice to indicate.

It is with the hope of once more reviving interest in this procedure as applied to the treatment of cancer of the pelvic organs that this contribution is offered. It is in no wise desired to leave the impression upon the reader that anything strikingly new or original is being presented. The purpose of the author is rather to present a modification and amplification of

* Read in part at the Sixth Annual Clinical Lecture on Malignant Disease, New York Skin and Cancer Hospital, April 20, 1910.

the method, at the same time making a plea for its more extensive employment in the treatment of irremovable cancer of the pelvic organs.

HISTORY OF ARTERIAL LIGATION.

The application of the ligature to blood vessels is said to have been practised at least eighteen hundred years before the vascular system itself was understood. It is not known who first employed the method, but ligation of bleeding vessels for the control of hemorrhage is mentioned in the writings of Celsus (30 B.C. to 50 A.D.), and of Galen (131-211 A.D.). Aëtius (502-575 A.D.), Avicenna (980-1037 A.D.), and others of the early authorities on surgery, employed the ligature for the control of hemorrhage and in the treatment of aneurysm.

The procedure then seemed to fall into disuse for centuries, and when practised at all its application appears to have differed little from that of a thousand or more years before.

When Ambrose Paré, the great French surgeon, revived interest in the ligature in 1552, improved the method of its application, and extended its field of usefulness, he was naturally accorded the credit for this important contribution to surgery. Paré besought the surgeons of his day to abandon the "old and too, too cruel way of healing" (by the use of the "red-hot iron"), and to embrace the new method of controlling hemorrhage by binding the vessels "toward their roots."

It is interesting to note that the plea of this great surgeon was little heeded, and that the beginning of the eighteenth century found the surgeons of the world still using the actual cautery for the control of hemorrhage.

Thus it will be seen that while the ligation of arteries was practised for centuries before Harvey discovered the circulation of the blood (1616-19), its use was limited to the control of hemorrhage and the treatment of aneurysm.

STARVATION LIGATURE.

With Harvey's discovery of the circulation of the blood, and the development of the knowledge of the part played by the blood in the nourishment of tissue, abnormal as well as normal, the method of ligating arteries increased in scope. It is now applied for the purpose of causing atrophy of organs and other parts of the body, and to lessen the nutrition of inoperable and irremovable new growths, thus retarding their further development.

This particular use of the ligature has given rise to the term "starvation ligature," and the procedure has been applied to the uterus, ovaries, testes, spleen, thyroid, tongue, brain (in epilepsy), and other parts of the body.

The discoverer of the circulation of the blood is himself credited with originating this newer application of the ligature in surgery, and for a long time the method was known as "Harvey's method." In 1651 he is said to have successfully treated a case of elephantiasis of the scrotum and testicle by ligating the spermatic artery. So far as is known, no further application was made by Harvey of this procedure.

The next recorded application of the starvation ligature is that of Lange, who, in 1707, employed the method in the treatment of goitre.

So far as the author has been able to ascertain from the literature, a hundred years elapsed before the method was revived with any definiteness.

Travers, in 1809, tied the common carotid artery in the treatment of a tumor of the orbit, said by some writers to be a fungous growth and by others to be an aneurysm.

From this time on the method was employed in a more or less desultory manner for various purposes, particularly in the carotid region. The history of this special application of the

ligature has been traced by Wyeth,* and his own admirable original work detailed.

Interest in the procedure was again aroused, in 1903, when Dawbarn** reviewed the history of the subject briefly, and detailed his own modification of the method by the exsection of the external carotid and its main branches, and the injection of the terminal branches with liquid paraffin, after the suggestion of Wyeth.

Our own work in connection with carotid artery ligation will be published at a later date.***

STARVATION LIGATURE IN THE TREATMENT OF MALIGNANT PELVIC TUMORS.

The application of the starvation ligature to the pelvic organs was first recorded by Fritsch, who, in 1885, advised and practised ligation of the uterine arteries in a case of fibroma of the uterus. He was followed by a number of surgeons.

To Baumgartner seems to belong the credit for having first tied arterial blood vessels in the treatment of irremovable cancer of the uterus, report of which was published in 1888. The uterine arteries were ligated by way of the vagina when this was possible, or they were merely divided and clamped. When the uterine arteries could not be reached by way of the vagina the ligature was applied to the anterior trunk of the internal iliac, at the origin of the uterine artery. Unfortunately, no details are given concerning the technic which he employed.

Kelly, in 1893, ligated the internal iliac arteries in the treatment of a case of cancer of

* Wyeth, John A.,—"Surgical Anatomy and History of the Common, External and Internal Carotid Arteries," 1878.

** Dawbarn, Robert H. M.,—"Starvation Treatment of Certain Malignant Growths," 1903.

*** In addition to those treated by ligation of pelvic arteries, and by other means, several patients were presented at the Annual Clinic who had been benefited by operation according to the Dawbarn method.

the uterus, the procedure in this instance being one of emergency rather than of selection, for the purpose of checking unexpected and otherwise uncontrollable hemorrhage. In the course of abdominal hysterectomy for squamous-cell carcinoma of the cervix, with extension to both broad ligaments, the ligatures cut through and free hemorrhage ensued. Both internal iliac arteries were ligated, the hemorrhage was controlled, and the operation was completed. The patient's condition was such, however, that it was impossible to remove all the diseased tissue. When, six months later, the patient was readmitted to the hospital to be treated for a vesico-vaginal fistula, careful examination failed to reveal the slightest evidence of the carcinoma. The patient died ten months after the operation,* presumably from extension of the growth.

The method was employed by Kelly and his assistants in other cases, but latterly they seem to have abandoned it entirely.

One of the most enthusiastic advocates of the starvation ligature in the treatment of advanced cancer of the uterus was the late Dr. W. R. Pryor, of New York City. In 1896 he ligated the internal iliac arteries with the avowed purpose not only of controlling hemorrhage, but for the "starvation of tissue which cannot safely be removed."** "In all cases," he said, "of cervical cancer where the infection has extended to the pelvic glands, in all cases of recurrence after hysterectomy, and in so-called inoperable cases I advocate the ligation of both internal iliac arteries as a step preliminary to any other." "My object," he further states, "is to remove all the tissue I can, and what I cannot remove I want to *starve*. I do not expect a radical cure

* Cullen's "Cancer of the Uterus," pp. 274-276.

** Pryor, W. R.,—"The Surgical Anatomy of the Internal Iliac Artery in Woman, and a More Radical Operation for Malignant Disease of the Uterus," The American Journal of Obstetrics, June, 1896, pp. 810-811.

is ever possible where once the glands are affected, but I believe that at least a retardation is possible."

Pryor ligated, through a median abdominal incision, the ovarian, the internal iliac, and the obturator arteries. He simultaneously ligated both internal iliacs for malignant disease of the uterus in thirty-four cases, with one fatality. In his experience, life was much prolonged and suffering diminished.

Polk, in 1896, Hartmann and Fredet, from 1897 to 1900, de Rouville, in 1904, Cantier, in 1907, and a number of others to whose contributions reference cannot here be made, have added to the literature of arterial ligation in the treatment of neoplasms of the pelvic organs.

The scope of this paper does not permit of an analysis of the various cases reported and the technic applied in each. In fact, in many of the instances recorded the technic is not detailed. There is quite enough evidence of a favorable nature, however, to warrant a wider application of the method in the treatment of irremovable cancer of the pelvic organs than is now made.

ANATOMICAL CONSIDERATIONS.

The effectiveness of arterial ligation in the permanent control of hemorrhage, and in the retardation of the malignant process in the pelvic region, is in a measure contingent upon the application of the ligature or ligatures with reference to the possibilities for the free anastomosis of the vessels supplying the diseased area, or for the establishment of a recurrent circulation.

Hartmann and Fredet concluded from their observations that, in the matter of hemostasis, the ligation of the uterine arteries alone is superior to the ligation of the trunks from which these vessels arise. In their experience the development of the tumor was not apparently influenced, the only results obtained being a temporary diminution of the hemorrhages and offen-

sive discharges. The author's experience does not lead to the same conclusion.

Ligation of the uterine arteries alone is not always sufficient to control hemorrhage, nor is it so effective in the retardation of the malignant growth as is ligation of the anterior trunk or of the internal iliac itself. Nor is ligation of the utero-ovarian arteries sufficient in all cases, a fair blood supply to the parts being maintained through the anastomosis of other branches of the internal iliac, or possibly through the establishment of a recurrent circulation. In the author's early experience* the ovarian and uterine arteries were ligated; or, if the uterine could not be reached, its nearest branches were tied off, or the anterior division of the internal iliac was ligated on the side of the most extensive involvement, the uterine and ovarian of the opposite side being ligated at the same time.

Ligation of the internal iliac artery of each side close to the bifurcation of the common iliac, thus shutting off all the branches of the posterior and anterior trunks of the internal iliac arteries, eliminates the chief blood supply of the uterus, vagina and pelvic fasciæ. If they are accessible without cutting into cancerous tissue, and if it is deemed necessary or advisable, the obturator, superior vesical, or other branches of the internal iliac, may be ligated individually, as practised by a number of surgeons, in addition to the main ligation of the internal iliac.

If, in addition to the internal iliacs, the ovarians and the sacra media, if it is large enough to warrant it, are ligated, the blood supply is sufficiently lessened to control immediate and usually all subsequent hemorrhage of any severity, and to offer a reasonable hope of checking the growth of the neoplasm.

From the above it may be fairly assumed that

* Bainbridge,—"Irremovable Cancer," N. Y. Medical Journal, October 3, 1908.

in many instances failure may be attributable to the fact that the ligation was not sufficiently extensive to control the blood supply to the pelvic organs, thus proving ineffectual in either of the purposes for which it is mainly applied—namely, the control of hemorrhage and the retardation of the growth. The author has personally found this to be the case, and has gradually extended the method accordingly.

In suitable cases he now ligates both internal iliaes just below the bifurcation of the common iliac, both ovarians and the sacra media. In some instances, as an emergency procedure, it may be necessary to ligate the common iliac artery just above the bifurcation, as in Cases XII and XXIV. With a recorded mortality of 75 per cent.,* naturally the ligation of the common iliac artery is to be resorted to only in cases of urgent necessity.

TECHNIC AS NOW EMPLOYED.

An incision is made a little to the right or left of the median line, the cut being carried quickly through all the tissues, down to the peritoneum. The abdominal cavity having been opened, the patient is placed in the Trendelenburg position. The intestines are then displaced toward the diaphragm, in order to give free access to the pelvis, being dyked off with warm pads so they cannot come down. This gives a free view of the entire pelvis, which is absolutely essential.

The ovarian arteries are now ligated, just above the pelvic brim, in one or two places, usually one being sufficient. Pagenstecher thread or strong silk is used for this purpose. It is important that the ligature be very securely tied in order to insure complete occlusion of the vessel.

The peritoneum on the posterior wall of the

* Ballance and Edmunds.—“A Treatise on the Ligation of the Great Arteries in Continuity,” pp. 4, 6 and 497. 1891.

abdomen is opened by a curved incision extending from one internal iliac artery to the other, with the convexity upward. As a rule this incision gives free access to all the retroperitoneal structures in the pelvis; occasionally, however, the meso-sigmoid is so short, or the adhesions are so extensive, that it is difficult to accomplish all that is necessary through the transverse incision. In such cases the ends of the incision in the peritoneum may be prolonged downward over the iliac vessels.

The internal iliac artery of each side is ligated in turn. The artery is carefully separated from its vein and ligated in two places. The first ligature is placed just below the bifurcation of the common iliac, and the second is placed half an inch below the first. With a large plain clamp the artery is crushed between the two ligatures.

In atheromatous conditions it may be necessary to tie the common iliac in order to obviate the danger of rupture following erosion of this vessel by cancerous glands at the bifurcation.

If it is possible to go below without getting into cancerous tissue, the uterine and the obturator arteries in addition may be ligated individually.

The sacra media, if large enough to warrant it, is next ligated, one ligature sufficing for this.

The ligation operation being completed, and accompanying pathological conditions corrected in proper sequence and to whatever extent is feasible, the posterior layer of peritoneum is closed, the intestines and omentum are replaced in position, and the anterior layer of peritoneum is brought together with a few simple stitches. The abdominal wall is then closed with through-and-through sutures of silkworm gut or silk thread. After the abdomen is closed the patient may be placed in the lithotomy position and thorough curettage, by the Byrne method or otherwise, may be done, where such procedure is advisable. With the arteries ligated as above

described, the uterus may be curetted to a shell without danger of hemorrhage. Zinc chlorid or acetone may now be applied to the interior of the uterine cavity.

In many cases of irremovable cancer of the pelvic organs the patient is in a condition of lessened vitality, which demands the greatest possible expedition in the operative procedure employed. In such cases, where a long incision is required, the method suggested by Kocher, of scratching the skin of the abdominal wall previous to making the incision, is of advantage, as it enables the operator to know just where to place the sutures, thus insuring quick closure. The through-and-through sutures of silkworm gut or silk thread are placed in the line of these scratches in the skin, and the closure completed with a few additional stitches in the skin. If desired, the peritoneum may be included in the through-and-through silk stitch. This method, which is employed by Bland-Sutton and others in general abdominal surgery, may be applied to cancer surgery in the class of cases cited.

With dehydrated patients and those with lowered blood pressure, hypodermoclysis may be resorted to throughout the operation, from one pint to one quart of fluid being introduced slowly under each breast at the same time, or alternately under one and then the other.

In the course of the operation, should it be found that the intestines are slightly involved, it is possible to peel off the affected portion. If any raw surfaces are left they may be folded in and a row of Lembert sutures inserted, or they may be covered over with omentum, in order to prevent the dissemination of cancer cells. Case XIX illustrates this point.

Wherever possible the ovaries are removed. This is done for three reasons: (1) In accordance with Beatson's theory of the presumptive influence of ovarian irritation upon the cancer process. (2) An otherwise normal ovary may

be subjected to a degenerative process as a result of pressure irritation by the cancer, or by adhesions later in the course of the disease, giving rise to additional and preventable discomfort. This emphasizes the fact that a cancer patient may suffer just as much from ovarian or tubal disease which is not cancerous as may the non-cancerous patient. (3) By cutting away the upper part of the broad ligament, in the removal of the ovary, a certain amount of collateral circulation is shut off.

In the course of the operation the glands along the iliacs are removed *en masse*, if possible, hot pads being used to prevent venous oozing. The glands which lie at the obturator foramen, if enlarged, are removed. The author, in a number of cases, has removed without difficulty the glands around the obturator foramen, taking them out *en masse*, and placing a hot pad over the area. If any of the glands are so softened that there is danger of breaking them and soiling the peritoneum, the operator must choose between the two evils—leaving them to ultimately break down themselves, or taking them out and running the risk of rupturing them and thus soiling the peritoneum.

In considering the technic, the following points should be especially borne in mind:

(1) That adhesions of a cancerous nature must not be broken up in order to reach and ligate the vessels. The differentiation, therefore, must be made between malignant and non-malignant adhesions. Sometimes extensive adhesions may be the result of old inflammation, and may have nothing whatever to do with the cancer so far as their origin is concerned. These may be safely dealt with and the vessels ligated.

(2) That cicatricial contraction in the diseased tissue frequently causes pressure upon the ureter, which may itself not be involved in the malignant process, as in Case XI. In such event the ureter may be stripped up, without breaking the

cancerous adhesions, thus relieving the pressure in the neighborhood. This is accomplished by inserting the finger or an instrument between the ureter and the connective tissue which lies over or under the cancerous tissue, carefully working the ureter free. If the ureter itself is involved in the cancer, this procedure is not applicable.

(3) That occlusion of the artery ligated is rendered certain by the crushing of the vessel between the two ligatures. This point is illustrated by the experience of a distinguished London colleague who, in a given case, tied off both ovarian and both internal iliac arteries. The patient improved for a time, then had a very severe hemorrhage and died. The surgeon had had several cases in which the procedure had been of distinct advantage, but this experience discouraged him. He held an autopsy in the case in question, and found each vessel encircled with a ligature, but he also found that both internal iliacs were patent, one being slightly and the other completely so. Another case illustrative of the same point is Case IX of the table.

(4) That should there be oozing from distant veins, this may be controlled with pads dipped in hot saline solution and left in place while attending to the other side; if this is not sufficient, the bleeding vessels may be tied. Pressure with hot pads should be employed first.

(5) That in dealing with suspicious glands situated directly in contact with large blood vessels, one must be careful to ascertain whether they are softened underneath, while apparently normal on the surface. Failure to note such a condition may lead to the rupture of an underlying or contiguous blood vessel, or to the soiling of the peritoneum by the breaking of such softened glands.

(6) That care must be taken not to injure the internal iliac vein, which lies just to the mesial side and behind the artery.

(7) That the ureters should be carefully iden-

tified as they cross into the pelvis, and retracted outward, thus avoiding injury to them.

(8) That the enlarged ligation clamp of Dawbarn is an admirable substitute for the blunt aneurysm needle generally employed. There is less danger of injury to the large vessels with the clamp than with the needle. The former is preferred by the author.

ADVANTAGES OF THE METHOD.

I. *Controlling Hemorrhage.*—(1) As an immediate life-saving measure; (2) to insure the patient against the awful possibility of death from hemorrhage during the progress of irremovable cancer; (3) to render possible further surgical intervention.

In some instances hemorrhage is the first symptom which causes the patient to consult a surgeon. In a number of these cases life is in immediate danger, in others it is more or less remotely so. In all such cases, even where little else can be done surgically, life may be prolonged and mental and physical suffering mitigated by the ligation of the arteries as indicated. The real danger of death from hemorrhage is thus removed, and the presumptive danger, the dread of which is so great in the minds of some patients and their families, is eliminated. The fact that in only a limited proportion of cases of cancer of the pelvic organs does death occur from hemorrhage in no wise nullifies this advantage of ligation. The fact remains that some patients do die from hemorrhage, and it cannot absolutely be predicted how this will be in any given case. Even if death does not result from hemorrhage, a sufficient loss of blood may occur to prove a serious menace to the patient's vitality, and to keep the patient and family in constant fear. Therefore, there being no contra-indications, the patient may justifiably be given this protection.

In cancer of the cervix, where curettage for

the removal of necrotic debris is indicated, the procedure may cost the life of the patient from hemorrhage unless the curettage is preceded by ligation.

An illustration of this occurred some time ago in the New York Skin and Cancer Hospital. One patient refused laparotomy. She was curetted, and everything was done for her that was possible under the circumstances, but she died some weeks later in the hospital from hemorrhage which could not be controlled by styptics and packing. Another patient, who occupied a bed in the same ward at the same time, submitted to laparotomy; the vessels were ligated, after which curettage was done, and she gained in flesh and strength, left the hospital in due time, and lived many months.

II. *Checking Extension of Malignant Growth.*—The assumption that a malignant process may be checked by cutting off the blood supply to the affected part seems to have been amply demonstrated by the recorded cases, though it must be admitted that there is a wide divergence of opinion on the subject. In some instances, where, because of the circumscribed nature of the growth, the possibilities of a more complete cutting off of the blood supply were greater, as in the cases reported by Packard, Treves, Wherry and others, cure seemed to follow the procedure.

This naturally leads to the thought that if, in advanced and hopeless cases, there is any real retardation of the process, in cases not so far advanced, where the method may be applied without injury of any kind, the possibilities for permanent arrest of growth warrant a wider application of the starvation ligature than has yet been made. The author has recently begun to employ arterial ligation in a series of cases less advanced than those herewith reported, and yet seemingly beyond radical removal of the diseased structures.

While the method is employed in the cases

herewith cited solely as a palliative measure, it is fair to assume that the extension of the process was checked to some degree in a fair percentage of cases, as judged from the improvement in the patient's general condition, the lessening of fetor, and the mitigation of other symptoms of advanced cancer of the pelvic organs. This conclusion seems warranted also by a comparison of cases in which ligation was resorted to with similar cases in which no such procedure was employed. Naturally, no absolutely positive statement can be made as to the retardation of the growth.

III. *Mitigation of Physical Pain and Mental Suffering.*—In many cases the pressure resulting from the growth gives rise to the most intense suffering, which is relieved or greatly lessened by the shrinkage which follows the ligation of the nutrient vessels to the diseased parts. This shrinkage is sometimes noted by those witnessing the operation. As soon as the vessels are ligated the parts are seen to pale and perceptibly diminish in size. Attention has already been called to the relief of other pressure or constriction symptoms which is made possible by the control of the blood supply, as in breaking up non-cancerous adhesions, freeing the ureter, etc. Furthermore, it has been observed by the author and others that there is often experienced by the patient considerable relief from pain and from the sensation of weight in the pelvis following moderate hemorrhage. If relief is secured for the time being by the temporary diminution of the amount of blood in the area, why not secure a permanent relative depletion, and a longer respite from the symptoms mentioned, by ligating the arteries supplying the affected region?

IV. *Diminishing Absorption of Poisonous Products.*—The sepsis which is characteristic of advanced cancer is not always from the cancer of the uterus alone, but from the broken-down glands

in the pelvis. Ligation not only facilitates the removal of glands between the uterus and the receptaculum chyli, but it in a measure shuts off the vascular avenues of absorption of toxic products. Cachexia is thus lessened, and the patient is rendered more amenable to measures which tend to promote elimination. This paves the way for the general tonic treatment, which is of little or no avail while the system is thoroughly clogged and poisoned by the absorption of toxic products.

In many cases the patient is dying not so much from the cancer alone, as from the absorption of poisons, some of which do not emanate from the cancer. In the effort to relieve suffering, morphin is often given in enormous doses. As a consequence, there is a veritable locking up within the body of poisonous products which now, even more than under other circumstances, need to be eliminated. Furthermore, in the effort to keep up the patient's vitality, large quantities of milk, with its more or less indigestible casein-content, are given, which it is impossible for the patient to assimilate or eliminate. Thus, well-meant attempts to aid are in reality merely hastening the end. How much better, then, in suitable cases, to ligate the vessels as described, thus obviating the danger of hemorrhage while opening up the avenues of escape of poisons, and fitting the patient for receiving the fullest benefits from whatever medicinal, dietetic or hygienic measures may be employed.

V. *Facilitating the Discharge of Pus and Necrotic Tissue.*—It is of the utmost importance that a free outlet for pus and necrotic tissue be maintained. In many cases this is impossible without danger of fatal or exhausting hemorrhage, and consequently it is no uncommon thing to find acetone or other styptic or cauterant agents applied to the cervix, so constricting the outlet that the pus and necrotic debris are dammed up in the uterine cavity. Sometimes, by inserting the

finger into the os and pressing upon the fundus from above, a gush of pus follows. With the vessels securely ligated the uterus may be curetted away to a shell without fear of hemorrhage. Once thoroughly cleared, the discharge continues less, and naturally the fetor is diminished.

VI. *Permitting the Application of Other Surgical and Non-surgical Measures.*—Curettage; cauterization by the Byrne method; the employment of ionic surgery, according to the method of Betton Massey; the intelligent and systematic use of acetone or other caustics; the use of radium or radio-gelatin, if desired; the trial of various non-surgical methods of treatment which from time to time are proposed, including vaccines, sera, etc., and the institution of the necessary hygienic and dietetic regime, may be facilitated by preliminary ligation of the arteries, as described. It is sometimes possible, furthermore, to do a great deal more, surgically, than seemed possible before the abdomen was opened. It is even possible to extirpate the uterus in some cases where such a procedure seemed impossible before laparotomy. Volvulus and other abnormal conditions of the intestine, causing obstruction or other symptoms, may be discovered and corrected upon opening the abdomen for purposes of ligation.

VII. *Giving a Psychic Adjuvant to the Physical Measures Employed.*—In advanced cancer of the pelvic organs more, perhaps, than in any other condition, there is need on the part of the patient for the encouragement and comfort which comes with the realization that *something is being done*. The latter days of such an individual are discouraging enough, to be sure, but how much more so must this be when it is realized that the medical adviser is merely temporizing with anodynes while waiting for the end. The conscientious physician and surgeon cannot lose sight of the humanitarian aspect of this unfortunate condition, however skillful may be his scientific management thereof.

CASES SUITABLE FOR LIGATION.

In the class of cases under discussion the method is not applied with a view to effecting a cure. On the contrary, it is essentially a palliative procedure, and, like all such measures, is limited in its field of usefulness.

It is to be borne in mind that this particular application of the ligature is not identical with that which has for its purpose merely the control of hemorrhage as a preliminary to hysterectomy or other extensive surgical procedure in the pelvis in so-called operable cases. Nor is it to be inferred that it is advocated in all cases of advanced cancer which are no longer amenable to the usual surgical methods for the removal of cancer of the pelvic organs.

The method is *not* applicable:

(1) If the patient is *in extremis* or markedly septic.

(2) If the cancer is thoroughly disseminated throughout the abdomen as well as the pelvis.

(3) If the bladder and rectum are already extensively involved, so that cutting off the blood supply sufficiently to accomplish the purpose of the procedure would cause the general sloughing of these parts.

(4) If cancerous adhesions are so extensive that it is impossible to reach the vessels for the purpose of ligation without breaking up such adhesions, thus still more widely disseminating the cancerous material, or hastening death from septic peritonitis.

(5) If there is no hemorrhage, if the patient is as comfortable as can be expected under the circumstances, if there are no urgent symptoms warranting some more radical attempts at relief than are usually employed in the treatment of irremovable cancer of the pelvic organs, and if the disease is of very slow growth.

The method *is* applicable:

(1) If hemorrhage which cannot be controlled by other measures threatens death.

(2) If hemorrhage has been sufficiently severe or frequent to warrant the fear of fatal return at any time.

(3) If hemorrhage is sufficient to cause a constant drain on the patient's vitality.

(4) When the disease is so extensive as to render curettage and other necessary measures dangerous because of hemorrhage.

(5) When, with no contra-indicative conditions, there is reason to believe: (a) that by controlling in a measure the progress of the disease, the pain, fetor and discharge may be lessened; (b) that various pressure symptoms may be relieved; (c) that intestinal obstruction may be corrected; (d) that other conditions giving rise to symptoms may be rectified.

(6) When all other measures have failed to give any relief from the symptoms in the given case, when the patient demands that something more be done, and when there is any hope of mitigating suffering and prolonging life.

CASE REPORTS.*

The histories synopsisized in the appended table represent all pelvic ligation cases operated upon at the New York Skin and Cancer Hospital, on the author's service, previous to the annual clinic, April 20, 1910, with two additional cases which are included because of their interesting nature and the remarkable improvement in the patient's condition.**

Of the twenty-four cases included in the table,

* Cases III, IV, and V were treated with the Enzymes (Trypsin and Amylopsin), and reported in the Medical Record, July 17 and August 7, 1909, and in the First Scientific Report of the Committee on Scientific Research, of the New York Skin and Cancer Hospital, 1909. The negative nature of the above report makes it presumable that the cases mentioned were not influenced by this treatment so far as any improvement was concerned.

** The entire number of cases in which the author has employed the ligation method in private or elsewhere is now forty-one. The further experience thus gained seems to fully justify the operation in selected cases.

only four are reported more in detail, viz.: the last two referred to above, and two cases in which the common iliac artery was ligated.

It is to be borne in mind that each case of the entire series, barring Case I., was considered incurable and the cancer irremovable. All details which would be essential in the record of the earlier stages of the disease are intentionally omitted here for the sake of brevity. In a good proportion of the cases curettage was resorted to after ligation, and other measures employed, none of which are noted in the table in every case.

CASE X.—F. E. M., aged 72. Cancer of uterus, with extensive involvement of contiguous structures. A few days before admission to the Middletown (Conn.) Hospital, March 1, 1909, service of Dr. John E. Loveland, there was considerable hemorrhage. The cervix and vault of the vagina were characteristically brawny at that time. Operation (by the author) March 8, 1909. Patient was then bedridden, in a very grave condition, in constant danger of hemorrhage, and considered a hopeless case by those in attendance, with only a few weeks, at most, to live. Both internal iliac, both ovarian and the sacra media arteries were ligated. Oxygen was administered intra-abdominally. Recovery uneventful. Patient gradually regained strength, and was able to go out about the town at will, in comparative comfort, and with no fear of hemorrhage. On one occasion, after undue exercise, there was slight hemorrhage from the vagina, more like venous oozing, but not sufficient to be of serious moment. Cachexia finally became marked, the patient gradually failed, and died January 25, 1910, nearly ten months after operation.

CASE XI.—Mrs. W. S., aged about 50. Cancer of the uterus, irremovable; large ulcerating mass in pelvis. Patient had always been apparently perfectly well until three years before operation, at which time she began to have some irregularity in menstruation and certain nervous symptoms,

all considered as indications of the establishment of the menopause. Dr. Ellis Hedges, the family physician, suggested an examination, but this the patient absolutely refused. There was gradual loss of weight and strength. Suddenly, and without special warning, an alarming hemorrhage occurred, in May, 1909. Dr. Hedges then made an examination, finding a large, ulcerating mass in the pelvis. He tamponed the vagina, and demanded consultation. Eight distinguished gynecologists or surgeons were consulted. Curettage was proposed as the only possible operative procedure. This was attempted, under ether, by Dr. Hedges, but the extent of the disease and the friability of the tissues made it impossible to do a thorough curettage. Acetone was applied locally after this. The author was then called in consultation, and ligation of the arteries supplying the diseased parts was proposed by him. Accordingly, on May 8, 1909, at the home of the patient, laparotomy was performed. The cancer was found to be irremovable. The left ureter was obstructed by cicatricial contraction of the diseased tissues surrounding it. It was as large as the finger, and stood out like a whipcord. The ureter was stripped up and freed from this constriction. Both ovarians, both internal iliacs and the sacra media were ligated. At the request of the family radiogelatin was employed, two drachms being injected into the tissues in the neighborhood of the cancer in the body of the uterus. There was considerable collapse at the time of the operation, but the patient made an uneventful recovery.

The hemorrhage was absolutely controlled; the bladder symptoms which had been present before disappeared; the pain, weight and tenderness in the obstructed left kidney were relieved by freeing the ureter; the discharge was lessened, and the general condition was improved. The patient gained sixteen pounds in weight, was able to preside at her own table, to take automobile rides, to go to the seashore and later to the mountains.

At the time of operation she was given a general anesthetic ostensibly for the purpose of making an examination and applying acetone, and so never knew that she had undergone a serious operation until long afterward, when she discovered the scar at the site of the abdominal wound. She never knew that she had cancer. She returned home in September, 1909, and after an illness of two weeks she died, probably from the shutting off of the kidneys by extension of the cancerous process. Death occurred October 2, 1909.

CASE XII.—Mrs. B. W., aged 38. Carcinoma of abdominal viscera (secondary to carcinoma of uterus, and following complete hysterectomy by another surgeon). Laparotomy May 24, 1909, at the New York Skin and Cancer Hospital. A large mass of cancerous material was found in the abdomen, involving the glands in the iliac region. There was softening of the common iliac at the bifurcation on the right side. The internal iliac was ligated below and the common iliac just above the bifurcation on the right side. The internal iliac on the left side was ligated immediately below the bifurcation. Both ovarians were ligated. There was a little temporary edema of the right leg, but this soon subsided, and no apparent harm resulted from the ligation of the common iliac. The patient left the hospital June 15, 1909, in much better condition than when she was admitted, with less pain and less general discomfort. She moved away, and was lost sight of after three months.

CASE XXIV.—Mrs. L. K., aged 44. Carcinoma of uterus. Operation May 9, 1910. The cancer was found to involve the entire pelvis. The sigmoid was adherent to the uterus; beginning volvulus of the small intestine. At the bifurcation of the left common iliac the artery was found to be diseased, and the common iliac of that side was ligated, this being the second case in the author's experience where it was necessary to ligate this vessel. The internal iliac of the right side was

tied. Masses of enlarged glands, which were pressing upon the sacral plexus, were removed. The pressure of the diseased tissues upon the left iliac artery almost shut off the pulse in the foot and leg of that side. The patient made an uneventful recovery, and was up and about the ward at the clinic, April 20, 1910. She was discharged from the hospital June 27, 1910, and has not been seen since that time.

Hasten the day when every woman will be examined regularly by a competent physician; when cancer will be prevented by the removal of known predisposing causes; and when, once the malignant process is established, it will be checked by early surgical intervention! After the chocolate-colored flow, the hemorrhage, and the various other symptoms which mark the advanced stage of cancer of the pelvic organs, have appeared, it is too late, as a rule, for cure to be effected by any known means. When, however, a woman allows herself, or is permitted by her physician, to reach this advanced stage, there is yet something to be done, in many cases, by skilful surgery. It is here that the starvation ligature comes into play. In selected cases the method has undoubtedly prolonged life and mitigated mental and physical suffering.

The condition of the victim of cancer of the pelvic organs is pitiable, at best, as the end approaches: and it is but natural that the patient, the family and friends, and even the surgeon himself, should ask, "Of what benefit was the ligation operation?" The question is answered, at least to the satisfaction of the author, by the mitigation of pain, of fetor, of discharge, of cachexia; by the control of hemorrhage in one class of cases and its prevention in another; by the presumptive checking of the rapidity of development of the malignant growth; and, finally, by the consciousness on the part of the surgeon of having earnestly endeavored to benefit the patient, even though temporarily, without thought of brilliant surgical feats or low mortality records.

34 Gramercy Park.

ARTERIAL LIGATION FOR IRREMOVABLE

No.	Name.	Age.	Hospital or Private.	Diagnosis: I. Clinical. II. Microscopic	Date of Operation.	Condition Found Upon Laparotomy, and Cor- rection of Same by Op- erative Procedure.
1	Mrs. M. S.	30	Skin and Cancer.	I. Fibromyoma. II. Fibromyoma, with carcino- matous degen- eration.	Sept. 26, 1906	Fundus Uteri seat of sev- eral nodular fibromyo- matous tumors, one the size of an orange; all ap- parently undergoing car- cinomatous degeneration. Hysterectomy; double Oophorectomy.
2	Mrs. F. S.	38	Skin and Cancer.	I. Carcinoma Uteri. II. Carcinoma.	April 15, 1907	Uterus firmly adherent to rectum; irremovable. Left tube and ovary re- moved; right involved in cancerous process.
3	Mrs. F. W.	39	Skin and Cancer.	I. Carcinoma of Uterus, ovar- ies, tubes, broad liga- ments, sec- ondary to Carcinoma of rectum and vagina. II. Carcinoma.	Feb. 7, 1908.	Extensive involvement of pelvic organs, including tubes and broad liga- ments; bladder; rectum. Ovaries and tubes re- moved.
4	Mrs. H. G	38	Skin and Cancer.	I. Carcinoma of pelvic viscera, with extension to abdominal viscera. II. Carcinoma.	Feb. 26, 1908.	Very extensive involvement with many adhesions, some of which were can- cerous; tissues very fri- able; disease irremovable. Intestines and parietes bathed in purulent fluid; a pool of pus found in pelvis. Posterior surface of bladder and a contigu- ous loop of gut gangre- nous.
5	Mrs. F. D.	49	Skin and Cancer.	I. Carcinoma of Uterus and bladder. II. Carcinoma.	April 18, 1908	Extensive involvement of uterus, broad ligaments and bladder; vesico-va- ginal fistula; irremovable.

CANCER OF PELVIC ORGANS.

Arteries Ligated.	Effect Upon: 1. Pain. 2. Feter. 3. Discharge. 4. Hemorrhage. 5. Extension of Process. 6. General Conditions. When Present.	Result.	Remarks.
Uterines Ovarians	1. Pain (associated with menstruation) relieved; none other complained of. 2. None present. 3. None present. 4. None present. 5. Checked. 6. Improved.	Discharged, Oct. 18, 1906. Living March 12, 1911.	Ligation, in this case, was resorted to sufficiently early, apparently, to check any extension which may already have taken place into contiguous structures. At any rate, patient is alive and perfectly well at present time, with no evidence of recurrence.
Ovarians. Broad ligaments ligated so as to include uterines, which could not be reached for ligation.	1. Mitigated. 2. None present. 3. Lessened. 4. None present. 5. Doubtful. 6. Improved.	Died June 24, 1907.	This was a very advanced case, and while the disease was probably not checked in its extension, the patient's remaining days were certainly made more comfortable than could otherwise have been expected.
Ovarians. Broad ligaments near wall of pelvis constricted by ligatures.	1. Mitigated. 2. Lessened. 3. Lessened. 4. None present. 5. Apparently checked. 6. Distinctly improved.	Died Aug. 17, 1908.	On June 25, 1907, the diseased portion of the vagina, and the anterior rectal wall, were excised. Recurrence took place, with pelvic extension, and patient was placed on the enzyme treatment, Feb. 5, 1908. (No. 94 of Enzyme Report). At last operation uterus was too extensively involved for removal. Uterine arteries could not be reached for ligation, without entering cancerous tissue. Patient left hospital in fair condition. Was able to be up and around and lived in comparative comfort, and with no hemorrhage, for six months.
Ovarians. Broad ligaments tied of en masse.	Negative.	Died Feb. 27, 1908.	Because of the advanced stage of the disease, this case was an unfavorable one for operative interference, but in view of the following facts it was decided to resort to ligation as a last hope of relief: (1) The increasing intensity of the pain. (2) The frequency and severity of the hemorrhages, which it was impossible to control by other measures. (3) The patient's piteous plea that something be done to relieve her. A mistake was made in this instance in ligating the broad ligaments, which were involved in the cancerous process, and in breaking up some of the cancerous adhesions. The internal iliacs could not be reached for ligation. Septic peritonitis supervened, and the patient died the day following operations. (No. 33 of Enzyme Report).
Ovarians. Uterines.	1. Markedly lessened. 2. Markedly lessened. 3. Markedly lessened. 4. None present. 5. Apparently checked. 6. Greatly improved.	Died November, 1909.	Patient lived many months, able to do light housework. Was present at annual clinic, in May, 1909, one year after operation. (No. 80, of Enzyme Report).

ARTERIAL LIGATION FOR IRREMOVABLE

No.	Name.	Age.	Hospital or Private.	Diagnosis: I. Clinical. II. Microscopic	Date of Operation	Condition Found Upon Laparotomy, and Correction of Same by Operative Procedure.
6	Mrs. M. R.	36	Skin and Cancer.	I. Carcinoma Uteri. II. Carcinoma.	April 27, 1908	Irremovable cancer of uterus and adnexa, with extension to cul-de-sac of Douglas and posterior wall of bladder. Double oophorectomy.
7	Miss M. M.	34	Skin and Cancer.	I. Carcinoma of Uterus, adnexa vagina. II. Carcinoma.	Dec. 2, 1908.	Extensive involvement of pelvic organs, including the glands. Irremovable.
8	Mrs. R. L.	50	Skin and Cancer.	I. Carcinoma Uteri. II. Carcinoma.	Feb. 12, 1909.	Irremovable cancer of uterus, involving broad ligaments.
9	Mrs. E. S.	32	Skin and Cancer.	I. Carcinoma Uteri. II. Carcinoma.	Aug. 10, 1909 (by member of staff). March 7, 1910. (Bainbridge.)	1st Operation: Cervix entirely destroyed by malignant process; glands in region of large vessels involved. Irremovable. 2nd Operation: Irremovable cancer of pelvic viscera; left internal iliac patent; right internal iliac occluded.
10	Mrs. F. E. M.	32	Middle town, Conn., Hospital Service of Dr. John E. Loveland.	I. Carcinoma Uteri. II. Carcinoma.	March 8, 1909.	Extensive involvement of uterus and contiguous structures. Irremovable.
11	Mrs. W. S.	50	Private.	I. Carcinoma Uteri. II. Carcinoma.	May 8, 1909.	Irremovable cancer of uterus; large ulcerating mass in pelvis. Left ureter obstructed by pressure from cancerous adhesions; ureter stripped up and pressure relieved.
12	Mrs. B. W.	38	Skin and Cancer.	I. Carcinoma of abdominal viscera (secondary to carcinoma of uterus, and following hysterectomy by another surgeon). II. Carcinoma.	May 24, 1909	A large carcinomatous mass was found in abdomen, involving glands in iliac region. Common iliac artery was softened at bifurcation, on right side.

CANCER OF PELVIC ORGANS.

Arteries Ligated.	Effect Upon: 1. Pain. 2. Feter. 3. Discharge. 4. Hemorrhage. 5. Extension of Process. 6. General Conditions.	When Present.	Result.	Remarks.
Ovarians. Uterines.	1. Mitigated. 2. Lessened somewhat. 3. Lessened somewhat. 4. None present. 5. Doubtful. 6. Improved.		Died Sept. 1, 1908.
Ovarians. Inter- nal Iliacs.	1. Mitigated. 2. Lessened. 3. Lessened. 4. None present. 5. Apparently checked. 6. Improved.		Died May 1, 1909.	Autopsy showed uterus to be small. Ex- tension of malignant process not as great as condition at time of operation would suggest.
Ovarians. Inter- nal Iliacs. Sacra Media.	1. Mitigated. 2. Lessened. 3. Lessened. 4. Entirely controlled. 5. Apparently checked. 6. Improved.		Died August 1909.	For eight months this patient had had an almost continous bloody discharge, with an occasional severe hemorrhage. After operation she gained in weight and strength. No more hemorrhages.
1st Operation: Internal Iliacs. 2nd Operation: Internal Iliacs re- ligated. Sacra Media.	1. Mitigated. 2. Lessened. 3. Lessened. 4. Not entirely controlled by first operation; com- pletely controlled by second. 5. Doubtful. 6. Improved.		Died June 4, 1910.	This case illustrates the importance of tying the artery in two places, and crush- ing between, in order to insure its com- plete occlusion.
Ovarians. Inter- nal Iliacs. Sacra Media.	1. Distinctly lessened. 2. Distinctly lessened. 3. Distinctly lessened. 4. Completely controlled. 5. Apparently checked. 6. Markedly improved.		Died Jan. 25, 1910.	Patient was bed ridden, in a grave condi- tion, in constant danger of hemorrhage, and considered an inoperable, hopeless case, with only a short time to live. After operation she gradually recovered strength and was able to go out about town at will. On one occasion, after undue exercise, there was slight venous oozing from vagina, but no real hemorrhage.
Ovarians. Inter- nal Iliacs. Sacra Media.	1. Mitigated. 2. None present. 3. Lessened. 4. Completely controlled. 5. Apparently checked. 6. Greatly improved.		Died Oct. 2, 1909.	Severe hemorrhage was the chief symptom before operation. Curettage had been at- tempted, but the tissues were too friable. Acetone was applied locally after curett- age; radio-gelatin used after ligation op- eration. Patient recovered sufficiently to preside at her own table, to go to the moun- tains and later to the seashore, and to take automobile rides.
Ovarians. Inter- nal Iliacs. Right Common Iliac (just above bi- furcation).	1. Mitigated. 2. Lessened. 3. Lessened. 4. None present. 5. Doubtful. 6. Improved.		Discharged June 15, 1909. Moved away, not heard from since.	Ligation of Common Iliac caused no symp- toms further than temporary edema of right leg. The condition of the vessel was such that hemorrhage from its rupture could be safely predicted. Ligation effec- tually prevented this contingency.

ARTERIAL LIGATION FOR IRREMOVABLE

No.	Name.	Age.	Hospital or Private.	Diagnosis: I. Clinical. II. Microscopic	Date of Operation.	Condition Found Upon Laparotomy, and Cor- rection of Same by Op- erative Procedure.
13	Miss M. R.	38	Skin and Cancer.	I. Carcinoma Uteri. II. Carcinoma (very malign- ant).	June 7, 1909.	Extensive involvement of uterus and adjacent struc- tures; bladder; rectum. Irremovable.
14	Mrs. R. B.	53	Skin and Cancer.	I. Carcinoma Uteri. II. Carcinoma.	July 20, 1909.	Floor of pelvis extensively involved, so that removal of uterus was impossible. The vagina was so con- stricted by the growth and cicatrix that it was im- possible to introduce a speculum.
15	Miss M. L.	38	Skin and Cancer.	I. Carcinoma Uteri. II. Carcinoma.	Aug. 3, 1909.	Irremovable cancer of uterus.
16	Mrs. P. S.	48	Skin and Cancer.	I. Carcinoma Uteri. II. Carcioma.	Aug. 5, 1909.	Irremovable and extensive involvement of uterus and contiguous structures.
17	Miss F. F.	49	Skin and Cancer.	I. Carcinoma of pelvic organs. II. Carcinoma.	Nov. 8, 1909.	Extensive and irremovable cancer of pelvic organs.
18	Mrs. E. C.	43	Skin and Cancer.	I. Carcinoma Uteri. II. Carcinoma.	Feb. 14, 1910.	Uterus hard and firmly fixed; cervix seat of ul- cerated, cauliflower-like growth; cystocele; rec- tocele. Cancer irremov- able. Salpingo-oopho-rec- tory, both sides.
19	Mrs. A. L.	23	Skin and Cancer.	I. Carcinoma of pelvic organs. II. Carcinoma.	March 12, 1910.	Entire posterior wall of uterus, posterior surface of broad ligaments, down to cul-de-sac of Douglas, in- volved in carcinomatous process. Small intestine adherent to uterus. Sev- eral inches of intestine peeled away down to mu- cosa. Cancer irremovable.

CANCER OF PELVIC ORGANS.

Arteries Ligated.	Effect Upon: 1. Pain. 2. Fecor. 3. Discharge. 4. Hemorrhage. 5. Extension of Process. 6. General Conditions. When Present.	Result.	Remarks.
Ovarians. Internal Iliacs. Sacro Media.	1. Mitigated. 2. Distinctly lessened. 3. Distinctly lessened. 4. Completely controlled. 5. Doubtful. 6. Markedly improved.	Died August 1909	Patient was very much weakened from hemorrhage, which had been almost continuous for several weeks. General condition, which had been very poor, was distinctly improved after operation. Disease gradually progressed to fatal issue, but there was no further hemorrhage.
Internal Iliacs. Uterines.	1. Entirely relieved for several months. 2. Lessened. 3. Lessened. 4. Controlled. 5. Doubtful. 6. Improved.	Died May, 1910.	Patient considered herself cured for a number of months. She did her housework, and refused to consider herself an invalid. Finally, in March, 1910, the bladder perforated into the vagina, giving rise to almost constant dribbling of urine. Gradually grew weaker. No recurrence of hemorrhage.
Internal Iliacs.	1. Lessened. 2. Lessened. 3. Lessened. 4. Controlled. 5. Apparently checked. 6. Greatly improved.	Died Oct. 23, 1910.	Severe pain and almost continuous hemorrhage were the prominent symptoms in this case. The pain was so much relieved that it could be kept under control by small doses of opiates. There was no return of the free hemorrhage. Metastases occurred in the abdomen, becoming palpable in August, 1910, and later obstructing the bowels. The improvement was striking for a year.
Ovarians. Internal Iliacs.	Negative.	Died Aug. 9, 1909.	No difficulty was experienced at operation, and patient was returned to ward apparently in good condition. Death occurred suddenly four days later, presumably from cerebral embolism. Clinical symptoms did not indicate peritonitis.
Ovarians. Internal Iliacs. Sacro Media.	1. Mitigated. 2. Lessened. 3. Lessened. 4. Completely controlled, until one month before death. 5. Doubtful. 6. Improved.	Died July 11, 1910.	Patient was up and about until four weeks before she died. On June 11, 1910, there was considerable hemorrhage. Hemorrhage from this time until death.
Ovarians. Internal Iliacs. Sacro Media.	1. Somewhat lessened. 2. Somewhat lessened. 3. Somewhat lessened. 4. Completely controlled. 5. No effect. 6. Improved.	Sent to City Hospital, March 10, 1910; Died May 15, 1910.	This was not a suitable case for any operative procedure, but the severe hemorrhages and the fear of her death from hemorrhage, on the part of patient and family, led to the ligation operation as the last hope of relief. An impending vesico-vaginal fistula developed, and the disease progressed to a fatal issue.
Ovarians. Internal Iliacs. Sacro Media.	1. Mitigated. 2. Lessened. 3. Lessened. 4. Completely controlled. 5. Apparently checked. 6. Improved.	Discharged April 2, 1910 Living, March 12, 1911.	Repeated severe hemorrhages had greatly weakened patient. After operation she gained flesh and strength, and was able to do light housework. She was present at the clinic April 20, 1910. Is still living; up and around (March 12, 1911).

ARTERIAL LIGATION FOR IRREMOVABLE

No.	Name.	Age.	Hospital or Private.	Diagnosis: I. Clinical. II. Microscopic	Date of Operation	Condition Found Upon Laparotomy, and Cor- rection of Same by Op- erative Procedure.
20	Miss E. N. A.	66	Skin and Cancer.	I. Malignant adenoma of vagina and uterus; epi- thelioma of vulva. II. Verified micro- scopically.	March 14, 1910.	Malignant adenoma of cer- vix and fundus uteri; uter- ine fibroids. Panhysterec- tomy, with removal of pelvic glands down to broad ligament. At a sub- sequent operation perine- um and left half of vagina, up to ischio-rectal fossa, removed.
21	Mrs. S. C.	47	Skin and Cancer.	I. Carcinoma Uteri. II. Carcinoma.	March 14, 1910.	Irremovable cancer of uterus cervix ulcerated and bleeding freely. Double oophorectomy.
22	Mrs. M. J.	42	Skin and Cancer.	I. Carcinoma Uteri. II. Carcinoma.	April 18, 1910	Irremovable cancer of uterus, extending deep in- to broad ligaments, in- volving bladder and right ureter, also rectum. Sig- moid flexure twisted on it- self—almost complete vol- vulus; loop of sigmoid ad- herent to rectum; bowel almost completely ob- structed. Adhesions broken up, bowel liberated, ventro-suspension per- formed.
23	Mrs. E. P.	43	Skin and Cancer.	I. Carcinoma of pelvic organs. II. Carcinoma.	May 2, 1910.	Uterus, broad ligaments, and base of bladder in- volved. Volvulus of small intestine, and kink in sig- moid, causing obstruction of bowel at two points; a loop of small intestine, which was twisted, was adherent for several inches deep in pelvis; liberated with difficulty.
24	Mrs. L. K.	44	Skin and Cancer.	I. Carcinoma of pelvic organs. II. Carcinoma.	May 9, 1910.	Irremovable cancer of uterus and contiguous structures. Sigmoid ad- herent to uterus. Intes- tine twisted in beginning volvulus. Sigmoid libera- ted; intestine straighten- ed. The bifurcation of the common iliac was diseased.

CANCER OF PELVIC ORGANS.

Arteries Ligated.	Effect Upon: 1. Pain. 2. Feter. 3. Discharge. 4. Hemorrhage. 5. Extension of Process. 6. General Conditions.	When Present.	Result.	Remarks.
varians. nternal Iliacs. sacra Media.	1. Mitigated. 2. Lessened. 3. Lessened. 4. Completely controlled. 5. Apparently checked. 6. Improved.		Living, March 6, 1911.	When abdomen was opened it was thought impossible to do more than ligate. After ligation, however, it was found possible to proceed as indicated. Hemorrhage had been very severe, the patient was greatly reduced in strength, and was considered by the family physician to be inoperable.
varians. nternal Iliacs. sacra Media.	1. Mitigated. 2. Lessened. 3. Lessened. 4. Completely controlled. 5. Apparently checked. 6. Improved.		Living, Feb. 24, 1911.	Hemorrhage, which had been severe, and which had reduced patient's strength, was checked. She gained in strength and weight after operation; was present at clinic April 20, 1910, and has lived in comparative comfort for nearly a year.
varians. nternal Iliacs. sacra Media.	Negative.		Died April 22, 1910.	Patient was rendered more comfortable by relieving obstruction of bowel, but her condition was so poor that she survived operation only four days.
varians. nternal Iliac. sacra Media.	1. Mitigated. 2. Lessened. 3. Lessened. 4. Completely controlled. 5. Doubtful. 6. Improved.		Discharged May 24, 1910. Has never re- ported for further treatment. Lost sight of.	Hemorrhage had been very severe. This case illustrates the relief which may be given by correction of conditions other than cancer.
nternal Iliacs. Common Iliac, eft side. sacra Media.	1. Mitigated. 2. Lessened. 3. Lessened. 4. None present. 5. Doubtful. 6. Improved.		Discharged June 27, 1910. Lost sight of.	The diseased condition of the left common iliac at the bifurcation made it fairly certain that rupture would have occurred in a short time. Ligation of the common iliac just above the bifurcation obviated this, and gave rise to no unfavorable symptoms.

SUMMARY OF RESULTS.

Case Number	I. Length of Life After Operation.	II. Effect Upon Symptoms.	III. Apparent Effect Upon Growth.	IV. Effect Upon Hemorrhage.	Remarks.
1	Four years, four months....	Improved....	Retarded....	None present...	I. Barring three patients who died within four days of the operation, and three who were not seen after discharge from hospital, the length of life varied from seven weeks to four years and four months; eight of this number living eight months and more.
2	Seven weeks..	Improved....	Doubtful....	None present...	
3	Six months...	Improved....	Retarded....	None present...	
4	Three days..	Negative....	Negative....	Controlled.....	
5	Seven months..	Improved....	Retarded....	None present...	
6	Five months..	Improved....	Doubtful....	None present...	
7	Six months....	Improved....	Retarded....	None present...	
8	Six months...	Improved....	Retarded....	Controlled.....	
9	Ten months...	Improved....	Doubtful....	Controlled (after second operation).....	
10	Ten months...	Improved....	Retarded....	Controlled.....	II. In twenty cases there was improvement in symptoms.
11	Five months..	Improved....	Retarded....	Controlled.....	
12	Unknown.....	Improved....	Doubtful....	None present...	
13	Two months..	Improved....	Doubtful....	Controlled.....	
14	Ten months..	Improved....	Doubtful....	Controlled.....	
15	Fifteen months	Improved....	Retarded....	Controlled (slight hemorrhage toward last).	III. Growth was apparently retarded in ten cases; doubtful in nine cases; negative in four cases.
16	Four days....	Negative....	Negative....	None present...	
17	Eight months.	Improved....	Doubtful....	Controlled (considerable hemorrhage one month before death) ..	
18	Three months.	Improved....	Negative....	Controlled.....	IV. Hemorrhage was not present in ten cases; controlled in fourteen cases.
19	Eleven months	Improved....	Retarded....	Controlled.....	
20	Eleven months	Improved....	Retarded....	Controlled.....	
21	Five months..	Improved....	Retarded....	Controlled.....	
22	Four days....	Negative....	Negative....	None present...	
23	Unknown.....	Improved....	Doubtful....	Controlled.....	
24	Unknown.....	Improved....	Doubtful....	None present...	